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THEORY OF APPLICATION ON RAYS IN DIGITAL IMAGE PROCESSING

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ABSTRACT

The aim of this paper is to develop a digital x-ray based on image processing system, study of Ultraviolet rays and the infrared rays. The X-ray is taken for a variety of purposes, including disease diagnosis. Therefore, a precise diagnosis of a bone fracture is crucial for medical professionals. In order to treat patients appropriately, digital x-ray images are helpful. X-ray images are typically used to analyze bone fractures. But occasionally, x-rays fail to detect or diagnose a disease due to image noise or blurry images. Ultraviolet rays are not visible , it is one of the fastest growing areas of Microscopy. UV imaging begins by passing a UV-emitting LED, bulb, or diode or by observing a subject that has been lighted by UV light that has been reflected from the object being inspected. In this paper, the infrared image denoising technology is studied.

Keywords: Digital Image Rays, X-Ray, Infrared Rays, Ultraviolet Band.

I. INTRODUCTION

A pictorial representation known as an image can be expressed in analogue wave forms. Image can be called as a digital image. If it's a pictorial representation that can be represented and stored in the digital form. Digital image processing and analogue image processing are the two categories into which image processing may be divided. Compared to analogue image processing, digital image processing has a number of benefits.

In the present day and age, there are many practical uses for digital imaging. As a result, there are several possible uses for digital imaging, including those in the environment, business, agriculture, the military, cinema and television, robotics, remote sensing, the medical field, face recognition, industrial applications, and others.

The most important task is finding which pixels correspond to which regions, how many regions there are in the image, and where the regions are located is the most crucial task, one is to enhance a picture's visual information for human interpretation, which is the basic goal of image processing, and another one is to improve its suitability for perception by autonomous machines.

II. X-RAYS

X-rays

X-rays are a crucial piece of equipment for doctors. Radiation in ionized forms, such as X-rays, is used to capture images employing rays. Doctors struggle to find a detailed view of the patient's body via x-rays. As a result, expensive technology like MRI scans and CT scans are used. X-ray scans of organs or tissues could not provide any medical information. Thus, digital x-ray technology represents the x-ray industry's answer. Digital radiography is another name for digital x-rays. Between the X-ray source and the film sensitive, absorption that passes through the patient changes the X-rays' intensity. Images are obtained in digital radiography using the following techniques:

1) By digitizing the X-ray films

2) By having the X-rays which is passed to the patient fall into devices and that converts the X-rays to light.

Digital X-ray

Digital x-ray can use in medical technology. It is utilized for image digital upgrading, image quality improvement, and image transport between locations. Chest x-ray pictures are captured by x-ray machines and converted into digital information. Jpeg and jpg format files can be created from digital X-rays. Preprocessing methods for digital images, such as RGB to Grayscale conversion and the required filtering methods, are used to apply the collected x-ray images.

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Image Future Extraction

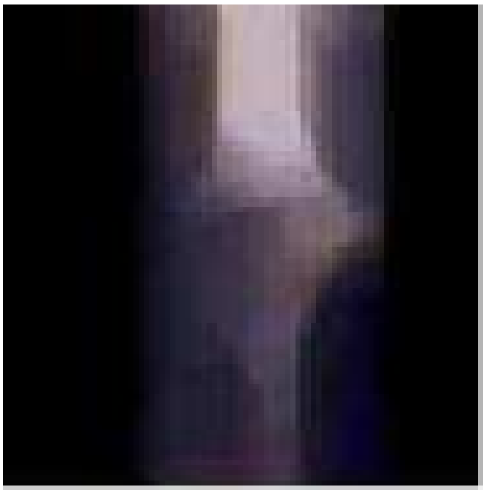

Figure 1: Original Image

Figure 2: Output Image

Image Edge Detection

The image pixels are reduced using edge detection. This technique locates the locations where the brightness of the image abruptly changes, becomes blurry, etc. The edge detection technique consists of two techniques: gradient and Laplacian. The Laplacian used the second derivative of the photos to detect edges while the gradient used the first derivative of the x-ray images.

Ultraviolet Rays

To learn more, go to ultraviolet (disambiguation). UV here is a redirect. See UV for further usages (disambiguation). lightweight ultraviolet lamp Electric arcs can also emit UV radiation. To avoid photo keratitis and severe sunburn, arc welders must cover their skin, use eye protection, and shield their eyes.

The wavelength of ultraviolet (UV) radiation ranges from 10 nanometers (nm; corresponding frequency: 30 PHz) to 400 nanometers (nm; corresponding frequency: 750 THz), which is shorter than the wavelength of visible light but longer than the wavelength of X-rays. Sunlight contains UV radiation, which makes up around 10% of the Sun's overall electromagnetic radiation output. Electric arcs and specialty lighting, such mercury-vapor lamps, tanning lamps, and black lights, can also produce it. Despite the fact that long-wavelength UV is not regarded as an ion radiation.

Figure 3: Portable ultraviolet lamp

Figure 4: UV radiation

Excimer laser

It is possible to create lasers that emit ultraviolet light, including lasers that cover the entire UV spectrum, laser diodes, solid-state lasers, and gas lasers. The electronic excitation of nitrogen molecules allows the nitrogen gas laser to emit a beam that is primarily in the UV spectrum. At 337.1 nm and 357.6 nm in wavelength, the strongest UV lines are present. Excimer lasers are a different class of high-power gas laser. They are common lasers with ultraviolet and vacuum ultraviolet wavelength emissions. Currently, integrated circuits are produced by photolithography using UV argon-fluoride excimer lasers operating at 193 nm. The Ar2* excimer laser, which has a wavelength limit of coherent UV generation of roughly 126 nm, is currently[timeframe?] available. It is a direct UV-emitting laser diode. to prevent photo keratitis and serious sunburn.

Solar Ultraviolet

UV radiation is produced by very hot things (see black-body radiation). The Sun produces ultraviolet light at all wavelengths, even at the very end, where it transitions into X-rays at a wavelength of 10 nm. Extremely hot stars emit UV rays proportionally more than the Sun does. Sunlight has a total intensity of about 1400 W/m2 in vacuum and is made up of roughly 50% infrared light, 40% visible light, and 10% ultraviolet light in space at the top of Earth's atmosphere (see solar constant).

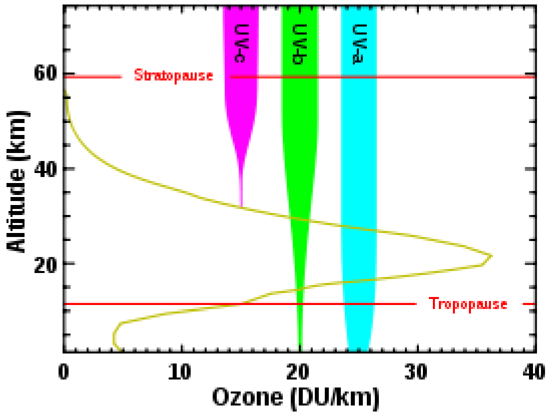

Figure 5

Infrared Rays

Infrared rays (IR) light is electromagnetic radiation with longer wavelengths than those of visible light, extending from the nominal red edge of the visible spectrum at 0.74 micrometers (µm) to 300 µm. This range of wavelengths corresponds to a frequency range of approximately 1 to 400 THz, and includes most of the thermal radiation emitted by objects near room temperature. Infrared light is emitted or absorbed by molecules when they change their rotational-vibrational movements.

Properties of infrared rays and the infrared light

Much of the energy from the Sun arrives on Earth in the form of infrared radiation. Sunlight at zenith provides an irradiance of just over 1 kilowatt per square meter at sea level. Of this energy, 527 watts is infrared radiation, 445 watts is visible light, and 32 watts is ultraviolet radiation. The balance between absorbed and emitted infrared radiation has a critical effect on the Earth's climate. Infrared light is used in industrial, scientific, and medical applications. Night-vision devices using infrared illumination allow people or animals to be observed without the observer being detected. In astronomy, imaging at infrared wavelengths allows observation of objects obscured by interstellar dust. Infrared imaging cameras are used to detect heat loss in insulated systems, to observe changing blood flow in the skin, and to detect overheating of electrical apparatus. Infrared imaging is used extensively for military and civilian purposes.

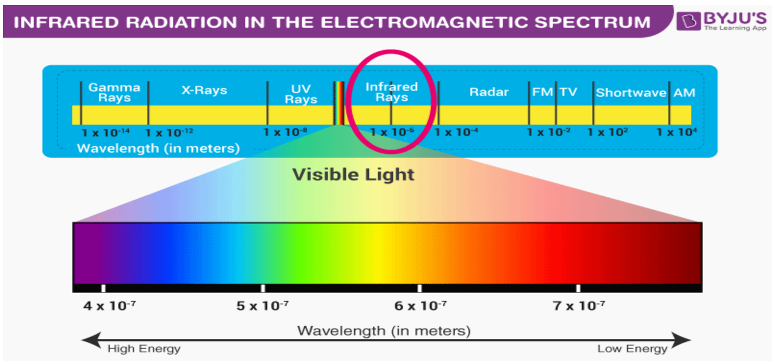

Figure 6: Infrared Radiation

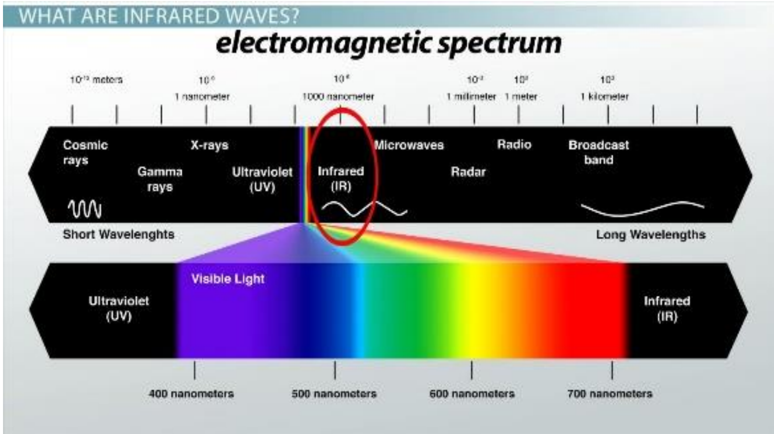

Figure 7: Electromagnetic spectrum

Characteristics of Infrared Radiation

- Infrared radiation consists of heat-inducing property.
- The origin is from an alteration in electron movement.

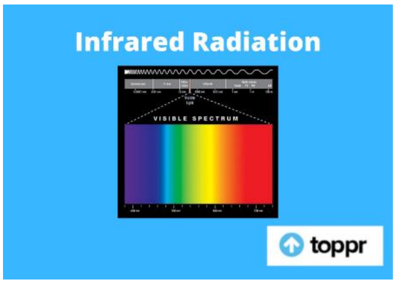

Figure 8: Infrared radiation

- Wavelength range from 710 nm to 1 mm.
- Frequency range from 430 THz to 300 GHz.
- Infrared radiation is a Transverse wave.
- Speed is 3X 108 m/s.

Effect of Infrared Rays

Even though infrared radiation cannot be seen by the human eye, it can definitely be felt. Infrared energy is felt as heat because it interacts with molecules by exciting them, causing them to move faster which increases the internal temperature of the object absorbing the infrared energy. Although all wavelengths of radiant energy will heat surfaces that absorb them, infrared radiation is most common in daily life because of the "ordinary" objects that emit it as radiant heat (see blackbody radiation and Wien's Law for more information on this). For example, humans at a temperature of 37°C[4] emit most of their radiant heat in the infrared range, as can be seen in

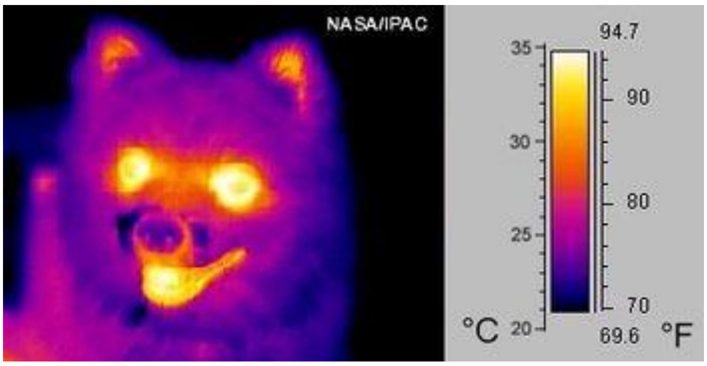

Figure 9: Infrared range

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Carbon dioxide is able to interact with infrared radiation, leading to an imbalance of radiation entering and leaving the atmosphere.

III. CONCLUSION

This research paper demonstrates the digital x-ray image capture. The images are saved in the digital format with reduced digital x-ray image noise and improved image quality, providing a clear image of the bones. On a set of patient's bones, this implementation can be tested, and the results can be computed using study paper. Image analysis reveals that the outcome is acceptable and that image quality can be raised. Future improvements include the ability to use various methods to implement digital x-rays in 3D views. The uses of infrared radiation represent a valid alternative to surgical lifting but cannot replace it.

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